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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,025	03/31/2004	Himanshu Pokharna	42P19252	9321
8791	7590	08/03/2005	EXAMINER	
BLAKELY SOKOLOFF TAYLOR & ZAFMAN 12400 WILSHIRE BOULEVARD SEVENTH FLOOR LOS ANGELES, CA 90025-1030			PAPE, ZACHARY	
			ART UNIT	PAPER NUMBER
			2835	

DATE MAILED: 08/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/816,025

Applicant(s)

POKHARNA ET AL.

Examiner

Zachary M. Pape

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 8-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 15-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Election/Restrictions***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-7, 15-29, drawn to a cooling apparatus, classified in class 361, subclass 700.
  - II. Claims 8-14, drawn to a method of manufacturing a cooling apparatus, classified in class 29, subclass 890.046.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as described in claims 1-7, and 15-29 could be made without using the attachment steps for attaching the fins.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Edwin Taylor on 7/25/2005 a provisional election was made without traverse to prosecute the invention of group I, claims 1-7, 15-29. **Applicant in replying to this Office action must make affirmation of this election.**

Claims 8-14 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Drawings***

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "means for reducing the distance from the top of the heat exchanger tube to the bottom..." of claim 22 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for

consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicant(s) regard as their invention. Evidence that claim 22 fail(s) to correspond in scope with that which applicant(s) regard as the invention can be found in correspondence filed 3/31/2004. In that correspondence, applicant has stated on page 7 of the specification, in paragraph 16, "The tube 410 may be flattened with a machine press", and this statement indicates that the invention is different from what is defined in the claim(s) because the invention entails a thermal management system, and the machine press is not a component of said thermal management system.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broder et al. (US 6,226,178) in view of Bucey et al. (US 4,171,015).

With respect to claim 1, Broder et al. teaches a mobile computing device, comprising: a processor (20), an evaporator (27) thermally coupled to the processor, wherein a working fluid of the evaporator picks up heat generated by the processor; and a heat exchanger (26) coupled to the evaporator to remove heat from the mobile computing device. Broder et al. fails to teach that the heat exchanger comprises a flattened tube and a plurality of fins coupled to the outside of the tube. Bucey et al. teaches a heat exchanger tube (48) comprising a flattened tube (As illustrated in Fig 1) and a plurality of fins (16) coupled to the outside of the tube. It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the heat exchanger of Broder et al. with the flattened tube and fins of Bucey et al. Replacing the heat exchanger (26) of Broder et al. with the flat tube and fin construction of Bucey et al. would reduce manufacturing complexities involved in producing round tubes which are taught by Broder et al. in Fig 3 (Bucey; Column 1, Lines 28-33). Additionally, the need for a separately manufactured heat sink would no longer be required reducing manufacturing costs.

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With respect to claim 2, Bucey et al. further teaches that the flattened tube is approximately two millimeters from top to bottom and eight millimeters from side to side. (The American Heritage College Dictionary 4<sup>th</sup> edition on page 70 defines approximate as "very similar, closely resembling". Therefore as best the examiner can tell, the tube as illustrated in Fig 1 of Bucey is approximately 2mm from top to bottom and 8mm from side to side).

With respect to claim 3, Broder et al. further teaches a fan (26b) coupled to the heat exchanger to reject the heat from the working fluid in the heat exchanger.

With respect to claim 7, Bucey et al. further teaches that the working fluid is water (Column 4, Lines 7-9).

**Claims 4-6 rejected under 35 U.S.C. 103(a) as being unpatentable over Broder et al. in view of Bucey et al. and further in view of Pearson (US 3,394,736).**

With respect to claims 4 and 5, Broder et al. in view of Bucey et al. teach the limitations of claim 1 above, but fails to teach that the flattened tube comprises internal fins. Pearson teaches the conventionality of placing internal fins within a tube (As illustrated in Fig 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the internal fins of Pearson with the flat tube and heat exchanging apparatus of Bucey et al. and Broder et al. respectively to provide an improved heat transfer medium flow through the tube (Column 2, Lines 64-67). Providing improved heat transfer increases the cooling of the CPU and therefore increases the operation of the mobile computer.

With respect to claim 6, Pearson further teaches that the insert is helically shaped (As illustrated in Fig 1).

**Claims 23-24, 26-27, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broder et al. in view of Pearson.**

With respect to claim 23, Broder et al. teaches a heat exchanger (26), comprising: a tube (25) a plurality of fins (26a) coupled to the outside of the tube to help remove heat from the tube. Broder et al. fails to teach that the tube has  $n$  internal fins to provide an even temperature distribution to the working fluid inside of the tube, wherein  $n$  is an integer greater than or equal to one. Pearson teaches a tube (10) having  $n$  internal fins (20) to provide an even temperature distribution to the working fluid inside of the tube, wherein  $n$  is an integer greater than or equal to one. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the fin insert of Pearson with the fins (26a) and thermal management system of Broder et al. to provide an improved heat transfer medium flow through the tube (Pearson; Column 2, Lines 64-67). Providing improved heat transfer increases the cooling of the CPU and therefore increases the operation of the mobile computer.

With respect to claim 24, Pearson further teaches that the  $n$  internal fins are built into the tube (As illustrated in Fig 2).

With respect to claim 26, Broder et al. further teaches that the heat exchanger is part of a refrigeration loop (The definition of refrigeration per The American Heritage College Dictionary 4<sup>th</sup> edition is: "To cool or chill", Page 1170. Further Broder satisfies the definition of a loop in that the coolant within the tubes loops from the evaporator



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(where the liquid evaporates) traveling in the vapor form to the condenser (where the vapor condenses back to a liquid) and further travels back to the evaporator completing the cooling process) wherein the heat exchanger of Broder et al. is designed to cool the liquid within the tubes.

With respect to claim 27, Broder et al. further teaches that the heat exchanger is part of a two-phase loop (As disclosed by Broder, there is an evaporator (where the liquid transformed into a first, gaseous phase) and a condenser (where the liquid is transformed into a second, liquid phase) wherein the loop is defined as the liquid being evaporated in the evaporator, traveling in the vapor form to the condenser where the vapor condenses back into a liquid where it travels back to the evaporator thereby completing the cooling loop).

With respect to claim 29, Border et al. further teaches that the tube is made of copper (Column 3, Line 43). Broder et al. fails to teach specifically that the internal fins comprise copper, however Broder et al. does teach in Column 3, Lines 55-59 that the internal fins are normally formed of an alloy having a greater hardness than that of copper. Therefore it would have been obvious to one of ordinary skill in the art to combine another metal with copper to create an alloy for the internal fins, thereby having internal fins that comprise copper, since copper is a notoriously old and well known material in the pipe art as suggested by the Pearson reference.

**Claims 15-21 and 25 are rejected under 35 U.S.C 103(a) as being unpatentable over Broder et al. in view of Pearson and further in view of Tomioka (US 6,900,990).**

With respect to claims 15 and 21, Broder et al. teaches a thermal management system of a computer system, comprising: a heat generating component (20), a cold plate (31) coupled to the component to remove heat from the component (As illustrated in Fig 3), wherein the heat is transported via a working fluid. Broder et al. fails to teach a pump coupled to the cold plate to transport the working fluid from the cold plate to a heat exchanger, wherein the heat exchanger comprises a tube filling that closely fits the tube. Tomioka teaches a pump (72) coupled to a cold plate (71) to transport working fluid from the cold plate to a heat exchanger (32/41). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the pump of Tomioka with the thermal management system of Broder et al. to provide greater circulation to the liquid coolant to improve cooling performance of the processor (Tomioka; Column 1, Lines 54-58).

With respect to the heat exchanger comprising a tube filling, Pearson teaches the use of a fin insert (18) designed to be inserted into a tube (10) as illustrated in Figs 1, 2. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the fin insert of Pearson with the heat exchanger (26) and thermal management system of Broder et al. to provide an improved heat transfer medium flow through the tube (Column 2, Lines 64-67). Providing improved heat transfer increases the cooling of the CPU and therefore increases the operation of the mobile computer.

With respect to claim 16, Pearson further teaches that the tube filling has a diameter that is less than or equal to the tube diameter (As illustrated in Fig 2, the tube filling fits within the tube).

With respect to claim 17, Pearson further teaches that the heat exchanger tube is approximately five millimeters in diameter (The American Heritage College Dictionary 4<sup>th</sup> edition on page 70 defines approximate as "very similar, closely resembling". Therefore as best the examiner can tell, the tube as illustrated in Fig 2 of Pearson is approximately (or very similar to) 5mm in diameter).

With respect to claim 18, Pearson fails to teach that the tube filling comprises plastic. It would have been obvious to one of ordinary skill in the art at the time the invention was made to comprise the tube filling of plastic since it was a well known material for creating tube fillings at the time of the invention and since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. Forming the tube filling of plastic provides the benefit of rust resistance, which would increase the life of the tube insert thereby increasing the quality/efficiency of cooling in the thermal management system.

With respect to claim 19, Pearson further teaches that the tube filling comprises aluminum (Column 3, Lines 58-59).

With respect to claim 20, Pearson further teaches that the tube filling is helically shaped (As illustrated in Fig 1).

With respect to claim 25, Broder et al. in view of Pearson discloses all the limitations as applied to claim 23 above, but fails to specifically teach that the heat exchanger is part of a single-phase loop. Tomioka teaches a heat exchanger (41) which is part of a single phase loop. It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made to combine the single phase loop of Tomioka with the heat exchanger and fins of Broder et al. and Pearson respectively to provide a heat exchanger with good circulation which efficiently transfers heat from the microprocessor (Tomioka; Column 1 Lines 54-58)

**Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Broder et al. in view of Pearson and further in view of Klawuhn et al. (US 5,613,523).**

With respect to claim 28, Broder et al. in view of Pearson teaches the limitations as applied to claim 23 above, but fails to teach that the tube is four to six millimeters in diameter. Klawuhn et al. teaches a tube (1) with a diameter between 4mm and 6mm (Column 1, Lines 46-48). It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made to combine the 4-6mm tube of Klawuhn et al. with the heat exchanger and fins of Broder et al. and Pearson respectively so that the tube has the appropriate strength to hold high pressure hot water (Klawuhn; Column 1, Lines 46-48, "so that the pressure hose fulfills the requisite test conditions" means that the tube therefore would not burst causing high pressure hot water to spill onto the sensitive components within). Manufacturing a tube with the optimum dimensions as

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specified by Klawuhn will keep the tube from rupturing causing damage to other internal computer components.

### ***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Belady (US 6,133,631) teaches the use of water as a cooling medium in a heat pipe. Gier Jr. (US 3,456,319) further teaches a pipe with both internal and external fins.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary M. Pape whose telephone number is 571-272-2201. The examiner can normally be reached on Mon. - Thur. & every other Fri. (8:00am - 5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn Feild can be reached at 571-272-2092. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ZMP

*A. Lee*

**ANATOLY VORTMAN  
PRIMARY EXAMINER**